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The Need for Digital Workplace:
Increasing Workforce Productivity in the Information Age

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ABSTRACT

Advances in communications, combined with lifestyle trends, point to a future workforce that is more productive and more capable than ever before. Employees are becoming increasingly dissatisfied with workplace capabilities as communications and productivity technology advances. Employees feel that their workplace is not smart enough and they are ready for a workplace that can accommodate their changing lifestyles. The past few years have seen an explosion in the use of smart workplace technologies. Interest in exploiting digital workplaces and smart offices is increasing, and deployments are gaining momentum. Yet the adoption rate is slow, and organizations are only beginning to scratch the surface in regard to the potential applications of smart workplace technologies. Implemented properly, the business benefits of digital workplaces can be substantial. This article explores the changing dimensions of the workplace. It highlights the importance of smart workplace technologies, identifies determinants of implementation success, and covers some of the potential benefits. Finally, this study reviews the successful implementation of smart workplace technologies in a small service industry.

KEYWORDS

Cloud Computing Technology (CCT), Digital Workplace, Digital Workplace Solutions (DWS), Information Work, Mobile Working, Software-as-a-Service (SaaS)

PURPOSE

There is no particular research stream on the digital workplace although scholars have conducted much research on the related topics. The purpose of this research is to do a systematic literature review and explore the practical implications of digital workplace technologies.

FINDINGS

The traditional office is transforming and will become obsolete in the near future. Digital workplace technologies, as portrayed in the sparse academic literature, as well as the wider trade literature, are

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found to be able to reshape and decentralize the traditional office. Effectively planned and implemented, the digital workplace provides more effective ways of working, increases productivity, and raises employee engagement. The digital revolution is under way however, our research suggests many companies remain confused about what they need to do to realize these benefits. We found compelling business results, including increased productivity and revenue growth, realized by organizations that have adopted digital tools. We also found that most organizations are unprepared for the arrival of digital workplace. Companies that are not adopting an integrated approach and training employees with new skills, are failing to capitalize on a significant opportunities digital workplace could deliver.

RESEARCH LIMITATIONS

Although the journey to digital workplace has already started, very few examples of the business benefits of a truly digital workplace realized by leading-edge companies are reported, and therefore effects are often anecdotal and notably, are often not fully tested. In our literature search we found few papers published in peer reviewed academic journals nor as academic working papers exploring advantages and limitations of firms implementing workplace digital technologies. We urge future research to test the enabling and constraining effects of digital tools and search for more empirical evidence of successful implementations of digital workplace in varied organizations. Research is needed to also recognize the downsides of digital technology usage for close relationships and effective collaboration.

PRACTICAL IMPLICATIONS

A dramatically changing workplace or a true digital workplace is at its very early stages of adoption. There is a widespread confusion in the marketplace about the true definition of a digital workplace. A good number of businesses incorrectly believe that email and social media capabilities are the requisite tools required for a digital workplace. A recent commissioned research found that only 44 percent of companies thus far have adopted digital workplace tools. Based on the business applications presented in this paper, practitioners would be wise to choose to better understand the potential enabling and constraining effects of implementing digital workplace technologies in different organizations.

ORIGINALITY/VALUE

Implementing a digital suite of tools, communications technologies, and enterprise social networks are by no means a panacea for many organizations. This article presents an important early academic contribution to a field dominated by narratives and of promises made by consultants. It also delivers condensed information for practitioners regarding the adoption of an integrated approach for the design and the implementation of digital workplace.

INTRODUCTION

The 20th century has seen a massive increase in industrial productivity, including a fifty-fold productivity growth in manual labor. But in most organizations, workplace productivity has not improved in such a fast pace. Fifty years ago, Peter Drucker said that "knowledge work" is the most important aspect of work in the advanced economy (Drucker, 1968). The world has changed drastically since then and the amount of digitized data is increasing at an exponential rate. Additionally, in the past ten years, office work has been shifting from repetitive tasks to knowledge based, flexible, and adaptive tasks. It has been proven that employees waste significantly less time and company resources when they have access to the right information at the right time, and by working in accordance with

productive work practices (Igloo, 2017). Therefore, increases in information related productivity would seem to be in the focus of modern organizations, as much as industry automation used to be in past decades. According to Drucker, the 20th century has seen a 50x productivity growth in manual labor (Drucker, 1999). "Information Mastery" is considered the Industry Automation of the 21st Century. Infocentric Research highlights the differences which characterize organizations and work within the industrial and information age (Schillerwein, 2011) (Figure 1).

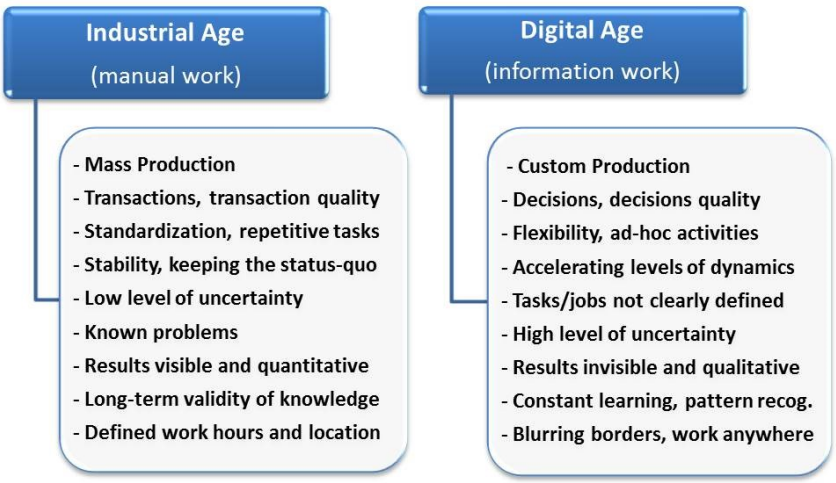
Companies are realizing the importance of workplace transformation which reflects modern work styles, user preferences and maturing technologies. A large portion of work today is "Information Work"—work that requires information to be executed, and in which information often determines the outcome of the work (The Work Foundation, 2009). Many enterprises do not consider information as an organizational resource and therefore do not manage it as such. It is erroneously assumed that information is managed automatically through technology. This mis-treatment of information oftentimes has immense effects on employee productivity, efficiency, effectiveness and profitability.

On the other hand, the proper treatment of information as an important organizational resource is key in gaining a competitive advantage-in a globalized economy. According to widespread research, quality and productivity are affected by employees not having access to the right information, such as where, when, and which information is required for the respective tasks (Igloo, 2017). A meta-analysis of 9 studies on wasted employee time found that an average of 1.1 hours per day was lost on unproductive information searches. This is a tremendous waste of time and productivity, considering that 1.1 hours per day is more than 12 percent of total work time summing up to more than 30 work days per year per person (Schillerwein, 2011). In a study conducted by IDC and commissioned by the Information Overload Research Group, significant numbers of employees indicated that (Gantz, Boyd, and Dowling, 2009):

1. Less than half of the information they need is searchable;
2. Searching is time consuming and frustrating; and
3. Searches for internal information are not successful most of the time.

This study found out that employees waste 25 percent of their time dealing with information overload related interruptions and distractions. Reducing the time wasted by 15% could save a company with 500 employees more than $2 million a year. According to this study, a high percent of

Figure 1. Industrial age vs. Digital age



managers and business leaders are also affected by information overload. They do not have sufficient information across their organization to do their jobs. Over 40 percent of surveyed managers said they use incorrect information at least weekly and they had the information they needed less than 75% of the time (Gantz, Boyd, and Dowling, 2009). A mature digital workplace has the potential to revolutionize the way information is treated in the organization and the way work gets done.

Today's workplaces demographics are also changing. A recent study conducted 3801 online interviews of adults who work more than 35 hours a week across nine different markets. The report analyzed adults who work in one of seven target industries: Education, Government, Financial Services, Healthcare, Manufacturing, Media & Entertainment, and Retail (Berland, 2016). The report findings are that the global workforce is at a tipping point. 44 percent of employees worldwide feel that their workspace is not smart enough, while more than half expect to be working in a smart office within the next five years. This study revealed that half of global employees currently work remotely at least a few times a week. 50 to 60 percent of the time, employees of Fortune 1000 companies around the globe are not at their desks. More than 30 percent said that the biggest time-wasters at their jobs were tech-related (slow, glitch software or devices) and that the technology they had available in their homes was more cutting-edge than what was available at their place of work (Berland, 2016). A 2011 study by Price Waterhouse Coopers, identified that by 2020, Millennials (22-37 years old) and Generation X (38-53 years old) will be 50 percent of the global workforce by 2020 and are reshaping the workplace (Price Waterhouse Coopers, 2011). Millennials are more willing to embrace workplace technology. It is anticipated that Millennials in particular, are more likely to quit a job with substandard workplace technology (Berland, 2016). Additionally, a study by Wainhouse Research revealed that the vast majority of meeting rooms have little or no teleconferencing and collaboration technologies in place and that 34 percent of office meetings start late because of technical difficulty (Haskins and Nilssen, 2015). These changes in technology and workforce require a workplace that boosts competitiveness, collaboration, and agility, and that also reduces the cost of both IT and business operations.

Today's workplace should provide employees with consistent, consumer-like user experience, one that is wholly aligned with the way people work today. Business leaders expect their digital workplace solutions (DWS) to raise employee engagement, enable employees to achieve business outcomes faster, and empower employees to reduce cost and increase efficiency. These leaders desire a robust IT service that is aligned with the way people work today, regardless of platform and location. Employees now expect a digitally-driven work experience that is personal, real-time, mobile-enabled, collaborative, and that exploits consumer-oriented styles and technologies.

DEFINITION AND EVOLUTION OF DIGITAL WORKPLACE

Over years, the workplace has evolved from being centered on offices, meeting rooms, and desk phones, to being focused on desktop computers. Many office documents and projects have gone online. Instant messaging has been embraced and email has become the dominant mode of correspondence. Thus was borne the digital workplace. One day it was a computer on a desk, the next it was work. Many organizations did not organize themselves in the right way to manage this change. Figure 2 highlights the evolution of digital workplace.

Industry and academia define a digital workplace in several different ways. In the simplest terms, digital workplace solutions (DWS) create connections and remove barriers between people, information, and processes as shown in Figure 3. When the barriers are broken, workers do their jobs more effectively and efficiently, and make the business more agile and competitive (Igloo, 2017).

The term "Digital Workplace" was coined by Charles Grantham and Larry Nichols in 1993 (Perks, 2015). Digital workplace is defined as collection of all the digital tools in an organization that allow employees to do their jobs. Those tools include intranet, communication tools, email, CRM, ERP, HR system, calendar and other enterprise processes or tools which assist in the general

Figure 2. The rise of digital workplace

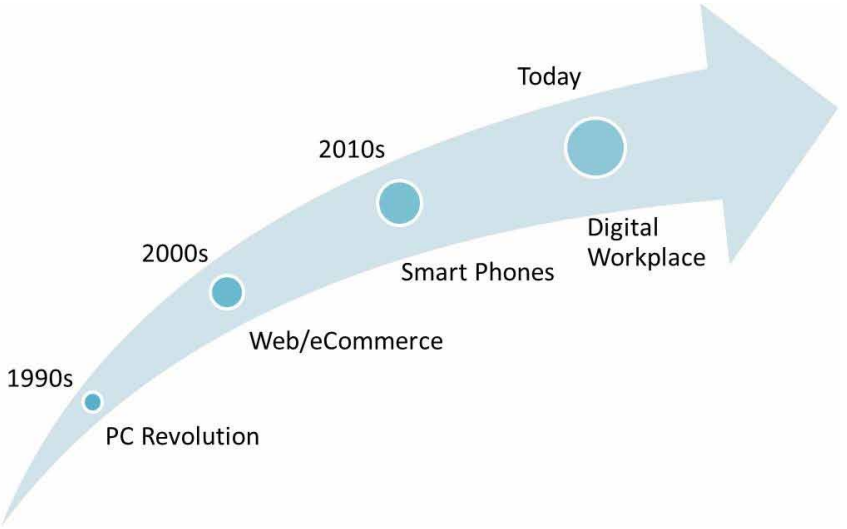
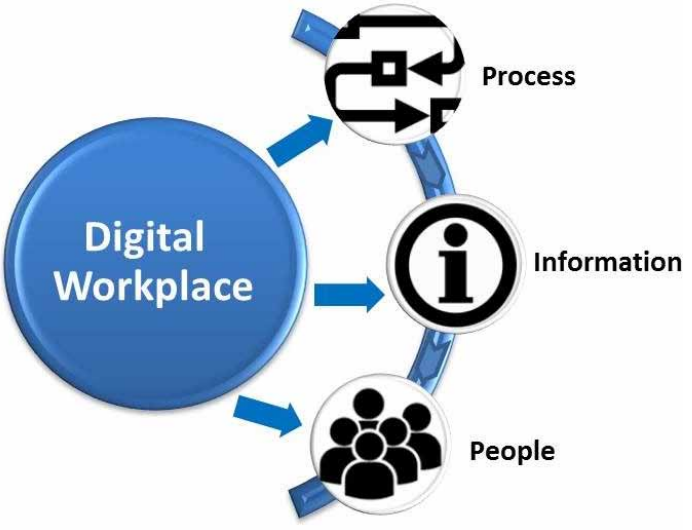


Figure 3. Breaking down barriers and creating connections



day-to-day functioning of a business (Perks, 2015). Getting digital workplace transformation right is vital for sustainable business success in a new digital first, consumer-centric business world. The digital workplace affects physical workplaces, technology, and people. Changes made in one area may result in changes in another.

Intel defines technology, agile workplace, and collaboration as pillars of a digital workplace (Constant, 2017). Another study by Infocentric Research, identified a framework for the digital workplace that includes three building blocks: personal performance, team performance, and organizational performance as described in Figure 4 (Schillerwein, 2011). These building blocks provide all of the information and function relevant to a person, team, or organization. They serve

Figure 4. A framework for the digital workplace

as a depository of all personal and team or project tasks combined, thereby enabling the ability to watch what is currently happening in all of the projects and activities. These building blocks do not exist in isolation from each other within the digital workplace. They blend into each other based on respective tasks and situations. They serve as a logical framework for creating the strategy and also concept design of the digital workplace.

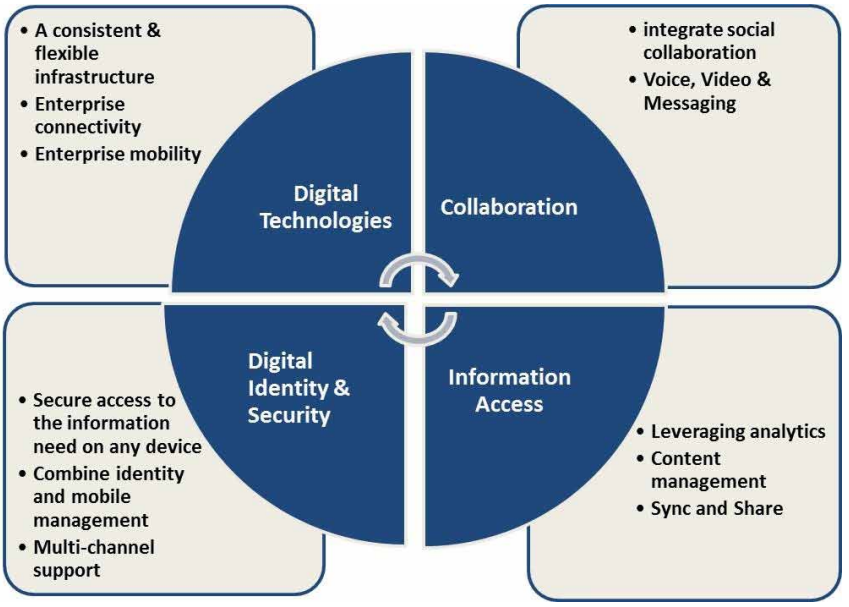
The digital workplace encompasses all the information, technologies, collaboration tools, and processes workers use to get work done on any device, anytime, and from anywhere. The digital workplace should be built on a consistent and flexible infrastructure needed to access and secure information across multiple devices, and channels. It should integrate video, and messaging to make life easier and make knowledge sharing more effective for all workers. Lastly, the platform should provide a secure access to the information needed on any device. Challenges the organization may face in the areas of governance, risk and compliance need to be resolved. Figure 5 highlights different layers of the digital workplace framework as described above.

The popularity of digital workplaces has soared in recent years. This accelerated change can be attributed to the emergence of three fundamental trends (Deloitte, 2014).

Information Overload

Information is growing at exponential rates. Businesses are struggling to find, filter and forward information to the right workers at the right time. In a survey conducted by IDC and sponsored by Xerox, 40 percent of those surveyed said they had the information they needed less than 75 percentof the time (Gantz, Boyd and Dowling, 2019). Declining customer satisfaction resulting from an inability of customer service agents to access the requisite information to solve their challenge is very high. A survey conducted by Omega Management Group Corp. and Coveo found out that 70 percent of customer service agents are facing significant challenges as a result of not being able to find necessary customer information. 73 percent of respondents identified improving information access and quality along with knowledge management as areas they are investing to improve customer care (Omega Management Group Corp. and Coveo, 2011):

Figure 5. Layers of the digital workplace



1. **The Need for speed:** Today's work environment is far quicker than it used to be. Employees are required to work faster, collaborate more effectively, and work more efficiently to meet deadlines and to successfully do their jobs;
2. **Workforce Demographics:** Businesses struggle to meet the varying needs of a multi-generational workforce. Knowledge is leaving the company as the baby boomers retire. Millennial workers are IT savvy and expect to have flexible working hours and easy to use tools.

ADVANTAGES OF DIGITAL WORKPLACE

The digital workplace is widely acknowledged for optimizing knowledge worker productivity. While there are few research streams on the digital workplace, scholars have conducted intensive research on related topics of collaboration, compliance, mobility, stress, and overload (Koeffer, 2015; Haas, Criscuolo, and George, 2015; Perlow, 2012; Przybylski, Weinstein, 2013; Reyt and Wiesenfeld, 2015; Sykes, 2011; Turkle, 2015; Mazmanian, Orlikowski, & Yates, 2013; Aaltonen et al., 2012).

One of the major advantages of DWS is reduction of waste in the organization. There are plenty of distractions and time wasters that take workers away from the task at hand. DWS breaks down barriers between people, information, and processes, thereby enabling workers to do their jobs more efficiently and effectively. According to IDC, top time wasters at work are (Schubmehl, 2014):

1. **Ineffective Meetings:** Meetings are costly. On average, a single employee attends 62 meetings per month and spends over 30 hours a week in meetings. According to a research study, from 30-50 percent of time in meeting is considered wasted. A majority of meeting attendees admit to daydreaming during meetings, while over one-third have dozed. This cost companies on average $9000.00 per employee per year (Infocom, 2018);
2. **Managing eMail:** A typical office worker spends almost 7 hours per week reading, replying, and sorting through emails. 33 percent of this time is spent on time-wasting tasks such as reading "Reply all" and trying to locate the email. IDC estimates that on average, the cost per employee is $8,000.00 per year (Schubmehl, 2014);

3. **Searching for People and Information:** People and information search are costly for companies. Workers spend 2.5 hours per week searching for people and information that are scattered throughout the organization. The annual cost is on average $7,000 per employee per year (Schubmehl, 2014);
4. **Re-Creating Work:** A typical office worker spends almost 2.5 hours a day duplicating work that already has been done. This costs companies on average $5,000 per employee per year (Schubmehl, 2014).

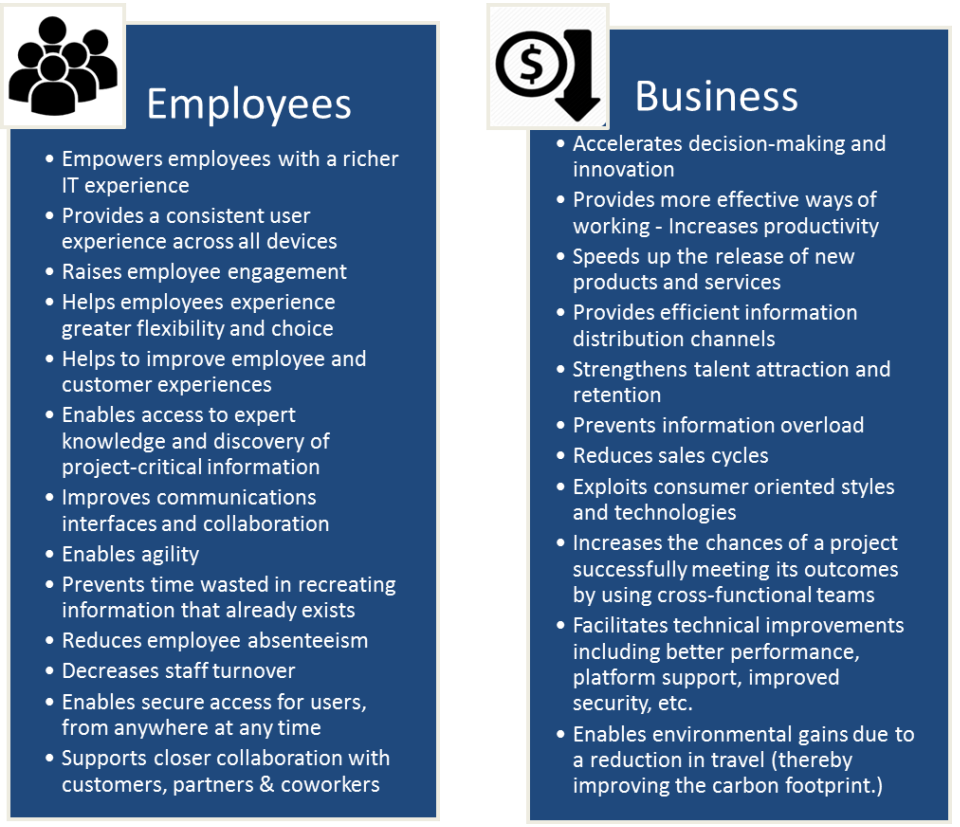
Figure 6 highlights annual costs of the most costly time-wasters at work. Effectively planned, communicated, and implemented, digital workplaces reduce costs and delivers compelling benefits. Integrating workplace technologies like mobile, cloud, analytics and social tools into workplace will empower employees to work faster and communicate more easily – at anytime, anywhere. In 2015, Wakefield Research surveyed 500 global C-level executives and IT decision-makers across seven countries regarding the advantages of a truly digital workplace. The results were clear and compelling: reduced costs, improved productivity, increased innovation, revenue growth, and employee engagement (Avanade, 2017). The digital workplace addresses existing challenges and provides measurable business value. For example, one company saved 43 minutes each month per manager with improved DWS. The company estimated an annual saving of $12 million (Deloitte, 2014). A 2011 New Ways of Working survey, which included more than 100 Fortune 500 respondents, found that between 2008 and 2011, alternative workplace programs resulted in improved employee productivity, increased business agility, increased employee attraction/retention, improved collaboration, faster access to customers/co-workers, and business continuity (Miller, 2012).

Additionally, a survey of HR professionals by the Society for Human Resource Management showed that the majority of respondents thought that flexible work arrangements and digital workplaces had a positive impact on absenteeism including fewer minor health problems, fewer signs of depression, fewer sleep problems, and reduced stress levels (Miller, 2012).

Improved productivity of employees is perceived as the main benefit of the digital workplace. According to several recent studies, a digital workplace in a modern enterprise provides many advantages for employees and business including increased staff satisfaction, improved employee experience, closer collaboration, reduced operational costs, enhanced innovation, improved customer experience, and increased revenue. Figure 7 summarizes benefits gained (Gantz, Boyd, and Dowling,2009; Schillerwein, 2011; Miller, 2012; Deloitte, 2014; Miller and March, 2016).

Figure 6. Average annual costs per employee for top time wasters

Figure 7. Benefits of digital workplace solutions



IMPLEMENTATION CHALLENGES AND OBSTACLES

Most existing information management systems deliver only limited value to their organizations. These systems are products of many years of organic growth and change. They often create as many new problems as they solve existing ones. These systems largely exist in isolation from each other. They are mostly static and passive, dated and primitive, and they set an expectation with employees that the organization need not be efficient. An effective digital workplace cannot be merely a combination of existing tools. The workplace must be enhanced by context, structured and unstructured information, and consistent coverage of information flows. In addition, the lack of a clear distinction between tools and business needs can also make an information management system ineffective. Without a proper business case, business need, and goal, technology delivers only a limited value. An on-going employee education on the proper usage of workplace technology is a necessary foundation for productivity and quality improvements.

There are numerous challenges in applying DWS for businesses in a way that allows for its significant and rapid growth. For example, the 2017 state of the cloud survey conducted by Rightscale identified the following as the most important challenges facing businesses (RightScale, 2017):

- Lack of sufficient internal resources (Lack of training/expertise);
- Lack of time to implement new initiatives;
- Difficulty of managing costs (governance and control);

- Security concerns (service traffic hijacking – phishing, buffer overflow attacks, and loss of passwords).

A recent study by Forester Research identified several reasons for lack of effective employee use of DWS (Forrester Research, 2017). Among them:

- Struggling to log onto multiple apps;
- Inability to access data and apps inside and outside of the office;
- Requiring help to access data.

Two separate recent studies conducted by Altimeter Group, and Adobe, surveyed enterprises regarding status of their digital workplace and mobile apps usage and found that (Solis and Littleton, 2017, Adobe, 2016):

- Two-thirds of employees rarely use their enterprise mobile apps due to poor experience;
- Two-thirds of large enterprises have no plan to develop their own apps;
- Three-quarters of companies surveyed did not have a "clear" understanding of digital touch points;
- Two thirds of executives surveyed thought their organization needs to pick up the pace in making the digital workplace a reality.

MAKING THE DIGITAL WORKPLACE A REALITY

Intel defines three pillars to making the digital workplace a reality as shown in Figure 8 (Constant, 2017). The following section describes theses pillars in detail.

Physical Workplace Transformation – Agile Workspace

The Digital Workplace is about changing the physical workplace and empowering the workforce through a well-thought-out workplace strategy that leverages a common platform that is integrated

Figure 8. Pillars of a digital workplace

with front and back office tools. Most important, it is about transforming the way your business works. Traditional offices are expensive, inefficient, inflexible and difficult to scale and modify. The digital workplaces or new offices should stand up to certain criteria as discussed in detail below.

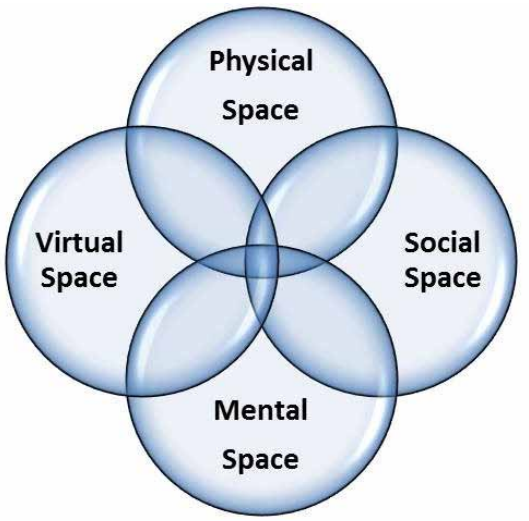
Digital Environments

Work is shifting from the physical to the digital workplace resulting in reduced office size or digital environment. Office configuration is also changing, and its role in the workplace is being adapted. The nature of work has changed and primary office space is unoccupied nearly one-third of the time. The Telework Research Network estimates the average business could save $2,500 to $5,000 a year in real estate and related costs for each half-time teleworker (Miller, 2012). According to Miller, digital environments, whether they are repurposed offices, home offices, co-working or "third places" should stand up to certain criteria. Among them, the quality of digital environments, the ease of intuitive accessibility, the ease of portability, the ability to operate consistently across the organization, whether in one region or globally, the security, and the ability to enable working beyond corporate borders (Miller, 2012). Physical workplaces and buildings play important roles in providing more flexible work and facilities, more open and shared spaces, and more collaboration and interaction. Workspaces should be designed around activities. Each agile workplace should have special "zones" connecting individuals and offering easier collaboration. At the same time, agile workplace should also provide a more relaxing and informal environment. An effective workspace design should provide more mobility and office dispersion, less paper and less storage, more attractive facilities, and increased utilization of available space (Constant, 2016).

Distributed Workspaces

Because of mobile technologies, knowledge workers are often absent from the office and spend their working time on the road or at customer or client locations (Bosch-Sijtsema et al., 2010). The workplace is seen as a place of interaction, collaboration, knowledge transfer, and communication (Harrison et al., 2004). A workplace is no longer only the physical office space, but rather a combination of physical, virtual, social, and mental spaces, which are interlinked with each other to form a collaborative working environment (Vartiainen, 2009) (see Figure 9). The physical space is the environment where work is conducted, such as the main workplace, home, or the premises of

Figure 9. Distributed workspaces



customers and partners. The virtual space is an electronic working environment such as the Internet which provides a platform that can be used for collaboration in a distributed workplace. Examples are e-mail, and more complex collaboration tools such as video conferencing. (Vartiainen et al., 2007). The social space is the whole social network of team members, managers and customers. The mental space refers to thoughts, beliefs, ideas and mental states that employees share through communication and collaboration. The work environment should be understood as an entity comprising all the previously described spaces. The challenge of digital organizations is how to make these four spaces support the knowledge workers' tasks in a distributed work setting. There is no one rule to follow. Organizations should start the process by analyzing the work of knowledge workers (Ruostela, and Lönnqvis, 2013).

Digital Technology Solutions

Having the right technology in place is critical. To support uninterrupted collaboration, the agile workplace requires a carefully designed IT infrastructure. The cross-functional delivery team should fix system constraints and upgrade the organization's network infrastructure to include the entire backbone and every switch, router, and firewall. The objective should be to shift to open workspaces, accessible meeting rooms, and modern devices. This shift should include installation of operating systems that allow for increased productivity and for the attraction of new talent. Each employee should be provided with upgraded tools, including a universal laptop, collaboration tools including video-conferencing, and voice-over-internet phones (VOIP) that ride on the network without constraint. The installation of a low cost, open, easy to use hardware and software and collaboration solution that can be easily upgraded and expanded over time is highly recommended. The tools needed to support the digital workplace needs will vary, depending on business and job functions. These tools need to be implemented not in silos but in an environment that benefit a holistic digital workplace strategy. A summary of suggested tools divided into different categories are shown in Table 1.

It is suggested that the four technologies of mobile, big data, cloud computing, and search-based applications should be integrated to achieve digital workplace desirable feature (White, 2012). The following sections describe these technologies in more detail.

Cloud Computing

Technologies like cloud computing and business intelligence have evolved rapidly and companies are using them to fully reap the benefits of the information age. According to a 2017 Gartner report, Cloud Computing Technology (CCT) is perhaps the most promising and anticipated technology to come around in a number of years (Gartner, 2017). For some businesses, making a connected move toward a cloud structure is a way to significantly cut hardware costs. For others, CCT will streamline operations and speed up development cycles. Properly planned and implemented, (CCT) has the potential to drastically improve operational efficiency in three types of performances: personal, team, and organizational. The Software as a Service (SaaS) model of CCT offers applications over a network (internet), and is accessible via browser or program interface. Since applications are delivered via on-demand software, they can be deployed quickly. This leads to ease of use and financial benefits. Companies can use the numerous cloud-based applications and services available for managing business projects, such as human resources, accounting, invoicing, document storage and sharing, and online backups, all at an affordable cost. Examples of providers offering this type of platform are Google Apps (email, calendar, and documents), Salesforce.com, and Intuit's QuickBooks.

Big Data Analytics

A big challenge for many companies is proper management of big data. Data is growing faster than ever before and it is everywhere: documents, the Internet, social networks, appliances, devices, sensors, etc. According to Gartner Research, data volume will grow 800 percent over the next 5 years (Gartner Report, 2017). One of the main challenges that many companies face is a lack of visibility

Table 1. Digital workplace solutions for managing various business activities

Software Tools	Service Provided	Digital Workplace Solutions
Business Applications	Provides employees access to online applications	• HR • CRM • ERP • Help desk • Accounting & Payroll • Contract Management
Messaging	Provides inexpensive and fast way to communicate	• Instant messaging • Mobile messaging • E-mail • Blogging • E-mail Marketing
Communication	Provides effective information sharing	• Portals and Intranet • Chat-based communication • Video conferencing • Voice over IP (VOIP) • Helpdesk
Productivity	Reduces time and increase efficiency of employees	• Word processing • Presentation software • Spreadsheet • Document management • Backup storage • Employee time tracking • Survey and campaign monitoring
Collaboration	Provides effective collaboration between employees and customers	• Teamwork • Online meeting • Team rooms • Web conferencing • File sharing
Workplace Mobility	Provides employees access to tools away from the office	• Mobile and smart phone • Laptop and tablet • Home office

into data. Transactional and operational systems store data in different locations and people do not have access to what they require when they need it. It is no surprise that the past few years have seen an explosion in business use of analytics. Corporations around the world are using analytical tools, including business intelligence (BI), dashboards and data mining, to gain a better understanding of their present customers and to predict who will potentially become future customers. Traditional business analysis is undergoing major changes. We are evolving from static and passive reports of what happened, to proactive analytics with real-time dashboards to see what is happening in every second. The factors that have contributed to underlying shifts include large volumes of data, the Internet, the evolution to the Cloud, and the changing demands of customers. The Internet revolution has created an environment where consumers want even more information and have greater expectations. Management wants fast answers, and analysts expect the data immediately and without latency. A new genre in BI tools has emerged. Modern BI tools offer data exploration and rapid prototyping. These new tools empower users to choose when, where, and how they interact with an organization.

Although most organizations already empower their employees with analytics tools to access data and improve decision making, many are now embedding analytics into their core business applications. The objective is twofold: first, to broaden their reach and second, to improve the timeliness of insights. Embedded analytics is not a new concept. However, the technology for

the integration of reports, charts, dashboards, and self-service tools has evolved rapidly over the past 30 years. While current users of embedded analytics are primarily large corporations, there are numerous additional industries and organizations where embedded analytics tools could advantageously assist decision makers.

Workplace/Enterprise Collaboration

Digital knowledge-sharing platforms have become central to problem solving in geographically dispersed offices (Hass, Criscuoolo, and George, 2015). Information and its flow through an organization are important enablers for the successful execution of business strategy. Information is an integral part of each and every task that gets executed in an organization and the outputs of these tasks are directly dependent upon information. The amount of digitized data continues to grow at an exponential rate and workplace collaboration tools for information sharing and meeting organizational needs are becoming increasingly important.

"Enterprise Collaboration" is defined as a system of communication among enterprise employees. It may include the use of some or all of the following: a collaboration platform, social networking tools, a corporate intrane, and the public Internet. Enterprise collaborations enable employees to share information and work together on projects remotely through a combination of software technologies, networking capabilities and collaborative processes.

The way today's knowledge worker collaborates is changing. Technologies include video conferencing, document-sharing, and groupware. The modern collaboration involves a mix of both in-person and virtual attendees. Wainhouse Research surveyed 200 commercial mid-to-large enterprises (>250 employees) and probed into collaboration tools the respondents use to get their work done. On average, over half of meetings include remote participants attending via audio, video and/or web conferencing (Haskins, and Nilssen, 2015).

Another technology that has drastically changed the landscape for workplace collaboration and enabled virtual, visual, and anywhere meetings is CCT. In a highly competitive business landscape, CCT enables dynamic collaboration between workers. Using web-based software, organizations can facilitate communication between suppliers, customers, and distributors and use this communication platform to make judgments about a firm's external environment. CCT has emerged as an exciting new means for empowering this type of communication. Usually, CCT is delivered as a paid service in exchange for third-party management of IT infrastructure. Companies rely on cloud-based workplace collaboration tools to increase employees' productivity. Mobile and remote end-users can use cloud-based messaging services or team collaboration platforms to interact and exchange information with multiple contributors. Collaboration platforms like Fuze, Slack, Workplace, and Microsoft Teams focus on broadly defined productivity improvements for employees by offering voice and video conferencing, and messaging. Cloud messaging services are an integral part of an enterprise digital workplace strategy. Cloud messaging services can assist geographically dispersed organizations to improve their productivity and project workflows. Team collaboration tools offer group messaging, file sharing, and voice and video conferencing support. These same tools also allow in-house and remote employees to easily interact and exchange information among themselves, and their customers and partners.

Software services in this category make teamwork easy, fun, and inexpensive. They are easy to set up and they provide collaboration tools such as shared desktops, white boarding, and in-app private chat. One can easily run and manage robust and easily-automated email campaigns by creating chat rooms for employees and by creating email templates that help send emails expeditiously. E-mail Marketing tools can be used for sending promotions, announcements of new features or services, and discounted coupons to customers. Table 2 provides a list of some of the cloud services available for communications and collaborations.

Table 2. Cloud services for communications and collaboration

Software Tools	Service Providers	Solutions
Teamwork	• Asana	• This platform makes teamwork easy. • "Fun-Free" version supports up to 15 members
Voice Over IP (VOIP)	• Citrix Grasshoper	• Provides access to basic phone systems such as call routing, faxing and voicemail.
Video Conferencing/ Online Meeting	• ClickMeeting • Microsoft Teams • Skype	• Provides inexpensive collaboration tools such as shared desktops, white boarding, and in-app private chat • Skype allows professionals to collaborate through screen sharing, instant messages, video conferencing, and audio conferencing and file sharing.
Chat-Based Communication	• Slack	• Allows users create chat rooms, private chats with small groups, and one-on-one private chats.
Email Marketing	• MailChimp	• Provides a rich, free plan and multiple email templates that help send emails quickly.
Campaigner Email Marketing	• Campaigner	• Enables running robust and easily-automated email campaigns.
Managing Social Campaign	• Hootsuite	• Enables management of social campaigns. • Offers tools for listening, publishing, &third-party integration.
Surveys and Campaign Monitoring	• SurveyGizmo • GetFeedback	• Helps employee build, style, test, and share surveys, and examine the results. • Helps solicit feedback from people using mobile devices.

IMPLEMENTING A LEADING –EDGE WORKPLACE TRANSFORMATION

A leading-edge workplace transformation initiative should take a holistic and cross-functional approach, spanning people, places, and technology. However, not all organizations experience success in implementing digital workplace transformation projects. Increasingly, digital projects are not strategically focused. All too often, organizations overly concentrate on technology rather than on the people using the systems. Technology, of itself, will never be the solution to all problems. As with any new investment, the key is to ensure that selected technology reflects the overall business strategy, and will significantly add value to business (Perks, 2015). Therefore, a cross-functional delivery team that includes senior leaders as well as IT, HR and Marketing should be formed. This cross-functional delivery team should assist future projects by providing access to expert knowledge, helping with the discovery of project-critical information, and enabling more efficient ways of working. The team should create a digital workplace strategy that clearly articulates business focus and guides the development of digital solutions.

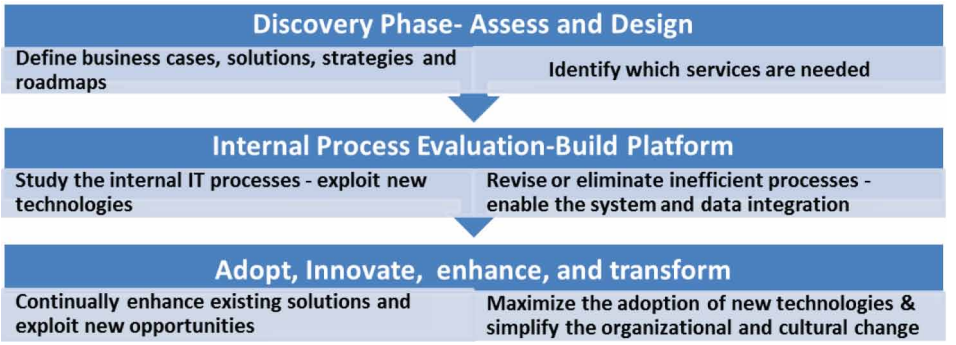
A Conceptual Model for Implementation

Gartner recently conducted a 12-month long survey of enterprises with cloud management strategies and identified the three phases of cloud adoption strategy. We adopted this model and modified it to fit a leading-edge workplace transformation initiative described below and summarized in Figure 10 (Smith, 2016).

In Phase 1, relevant employees should:

1. Learn about digital technology solutions and perform a detailed analysis of the applications and services the company requires;
2. Identify the business goals the company is trying to achieve with the digital solutions and translate them into guiding principles to drive development; and

Figure 10. Implementation phases



3. Implement a digital strategy, considering technology implications and alignments with corporate objectives.

The workplace strategy should set clear priorities and serve as a blueprint for the roles and relationships of each department. Define a clear business case and timings for the enterprise digital strategy. Identify which services and digital workplace tools and solutions are needed. The most impactful deployments start with users fully understanding their desired business outcomes and then identifying the services that will be offered. This requires asking questions such as what services users need, how much of each service will be consumed, when each service will normally be consumed, which users will consume each service, and what is a reasonable price for each service need to be answered.

In Phase 2, relevant employees should work with the CIO and business stakeholders to document and analyze the internal processes that will be affected by the selected digital solutions. During this analysis, they should study the internal processes involved with offering relevant digital solutions. This might bring to light the need to flatten, reconfigure, realign, refine, or eliminate inefficient processes and target repetitive manual processes for automation. The types of security that will be applied to the deployment must also be addressed. Enable and bring together user-friendly systems, data integration, social, mobile, analytics and cloud computing technologies to create a digital workplace that responds to the informational needs of employees. Companies should integrate social collaboration tools like voice, video, messaging, and workspace tools to make knowledge sharing more effective and they should provide the requisite platform to access and secure information across multiple devices and channels.

In Phase 3, companies should continually enhance existing solutions, maximize the adoption of digital solutions, and ensure user adoption. As workers' needs evolve, these companies should continually exploit new opportunities and deliver a consumer-like experience and a consistent user experience across multiple platforms for internal employees. Corporations should simplify the organizational and cultural changes that hinder the adoption of DWS. They should engage with users, to understand their needs and articulate how the digital workplace enables them to work productively. Firms must ensure that employees have access to training that enables them to use the digital solutions to their advantage, and that technical personnel and trainers are trained properly to support the digital solutions technology. Lastly, firms must provide policy training for employees on the type of information they should or should not share, and on the handling of personal (do you mean "personnel" data?) data, and the avoidance of potentially damaging organizational data.

Key Factors to Consider

In order to fully reap the benefits in the digital workplace, organizations need to take a holistic view of the scope of digital work projects and consider the following critical issues:

- Take a cross-functional and holistic view of digital work place and involve representative from key stakeholders on the delivery team;
- Ensure that the project is enterprise-wide and encompasses a significant proportion of the workforce;
- Enable employees to have a choice of workplace location;
- Help to improve employee and customer experiences;
- Aim to change the way employee actually work;
- Choose collaborative tools that are easy to use and accessible.

CASE EXAMPLE OF SUCCESS

On the whole, companies need to leverage several systems in a centralized way to make sense of information and support better decision-making. The business strategy and the organization's goals of the digital workplace imitative should determine which digital tools should be used. In this section we discuss case example of a small business that has successfully migrated to digital workplace and that has been using various digital solutions throughout its company for many years.

Interactive Educational Services, Inc. (IES) was founded in 1994, in Bakersfield, California, to provide expertise in developing and managing online educational activities, certificate programs and professional designation programs. In 2002, the company changed its direction and started offering a full range of web development packages and e-Business solutions to private and nonprofit organizations all around the US. IES is developing new tools, teaming with Web specialists, and forming new alliances that keep it at the forefront of the web technologies movement (IES web site, 2018). One of company's platforms called "Cyberschool" is being used by more than 1,000 schools nationwide. It is a great platform for improving communications throughout the school district and reaching the community at large. With more than 2,000 customers in 48 states, IES is the biggest web and Mobile App development company between San Francisco and Los Angeles. IES *efforts have been recognized in Forbes and Entrepreneur magazines.* In 2008, the company was the Recipient of *Goldline Research* awards for "The Most Dependable Web Designers" in California (*Goldline Research*, 2008) and in 2009 and 2010, IES was the recipient of the "Leading Web Provider" of the Western United States (*Goldline Research*, 2009 and 2010).

IES has helped many companies increase productivity, reduce costs, and improve customer loyalty by optimizing their web presence. At the same time, the company has combined effects of emerging Internet technologies, increased computing power, and fast, pervasive digital communication to spawn new ways to manage talent and assets as well as new thinking about organizational structure. As a first step in the transformation journey, IES identified the business goals it is trying to achieve with the digital workplace and translated them into guiding principles to drive ongoing development of solutions. Additionally, IES defined the focus of the digital workplace strategy and aligned it with existing information management strategy. The main objectives were reduced operational costs, accelerated time-to-market for our portals, increased agility and flexibility, improved employee satisfaction, improved customer experience, and increased revenue. While it was important to note which technologies corresponded to certain use cases and working styles, knowing these technologies in depth helped IES identify areas in its workforce where a lighter-weight, less expensive solution could solve a systemic problem.

The company considered the intranet as a platform that links everything together. Agreed what were the most common ways that employees wanted to work, collaborate and communicate with one another. Worked out which tools, apps and services to target and personalized to the right employees who needed them most.

As the technology landscape continued to evolve, IES made CCT the core of its digital technology upgrade. According to Mike Diaz, IES project manager, since 2002, the company has been using Web-based cloud services for e-mail marketing, video conferencing, Customer Relationship Management (CRM), financial analysis, document and spreadsheet creation, and for bypassing capital investment in servers and software licenses (Site Visit to IES, February 2018). Since the introduction of CCT, operating costs have reduced and efficiencies have increased. IES has experienced a noticeable increase in office productivity. For example, between 2014 and 2017:

- The time that it takes to design and develop a custom web site decreased by 30 percent;
- The cost of IT support and customer service decreased by 40 percent;
- The office productivity increased by 35 percent as measured by fewer number of employees.

Software-as-a-Service (SaaS) has enabled IES to access many services at a low cost. More specifically, the company is using the power of CCT to enhance its DWS in the following ways (Site Visit to IES, February 2018).

Communications and Collaborations

- **Voice Over IP (VoIP):** IES is using Asterisk to gain access to basic phone systems features such as voicemail, call routing, faxing, call recording and dial-in conferencing for its 15 employees;
- **Video Conferencing and Meeting Management:** IES is using Zoom for video conferencing and Go-to-Meeting for meeting its customers online for demonstration of its platforms or for providing customer support. Features such as shared desktops, white boarding tools, and in-app private chat enhance communication with customer;
- **E-mail Marketing:** IES is using email marketing service provided by Send Blaster effectively for sending promotions, announcements of new features or services, and discounted coupons to its customer. IES takes advantage of email analytics feature provided by the module to find out whether its messages and or promotions are effective or are falling flat;
- **In-House and Online Chat with Customers:** Rocket.Chat provides IES employees with an easy-to-use and a powerful communication platform. This chat-based communications tool is designed for teams of all sizes to communicate with one another thorough the workday. IES employees create chat rooms, private chats with small groups, and share files. The Online feature enables IES to communicate with prospects while they are browsing the company's web site;
- **Help-Desk and Customer Service Ticketing:** IES staff provides phone, email and/or help desk support on an ongoing basis. Technical support technicians are available to work with clients to resolve any and all issues that may be experienced. In order to streamline support requests and better serve its customers, IES utilizes OS Ticket, a support ticket platform. It features a combination of automation and self-service tools that reduce ticket workload in order to provide fast customer service. Every support request is assigned a unique ticket number which can be used to track the progress and responses of customers online. For each reference, the platform provides complete archives and history of all customers' support requests.

Security and Network Monitoring

According to Robert Mann, the company IT director, IES provides web hosting services, with solid security and data protection, to all of its more than 2,000 clients. In addition, IES uses private cloud

infrastructure. All servers are located in a building off premises and are managed by the CenturyLink, a secure management service. Private clouds provide greater control over the cloud infrastructure and are ideal for IES customers. IES servers are run on a secure, high-end redundant computer network. The hosting service offers a secure state-of-the-art data center with 24-hour, year-round monitoring system to ensure maximum uptime and system protection along with daily backups, redundant internet connections and on-site generators with battery backups. IES also employs the following cloud software services for the security and maintenance of its CCT (IES, 2018):

- Network Monitoring- Site 24x7;
- AntiVirus – Kaspersky and Malware Bites;
- Server Backup – Storage Craft and Home Written Scrips, for providing automatic backups and delivering excellent security.

Mobile Communications and Social Media Marketing

- **Mobile Communications:** Mobile communications are essential when it comes to engaging K-12 digital parents and keeping them informed about school events and activities while they're at work or on the road. A branded mobile app can deliver the most often requested school information and news updates. IES develop Mobile App for its k-12 Cyberschool clients. The company uses two frameworks, Ionic and CF Wheels, for developing hybrid Apps. Both frameworks offer a nice selection of templates and fields to help guide IES through the creation process;
- **Web Analytics:** IES is using Google Analytics, one of the most widely *used* web *analytics* service on the Internet. Using this free software analytics, IES's clients can track and report website traffic for their web sites. The analytics gives clients insights into how users find and use their websites. They can sift & sort their visitors with dozens of dimensions. They can also track ROI for their online marketing;
- **Social Media Marketing:** IES is using a healthy balance of social media marketing channels, including organic search, email marketing, events, social media and other lead sources. Moreover, IES is using AdWords – Google's pay-per-click (PPC) advertising system for its own web site because AdWords delivers measurable ROI. Compared to traditional marketing channels such as TV and magazine advertising, online marketing is highly measureable, and AdWords is one of the most measurable and flexible of online channels. It is transparent, providing a multitude of metrics that allow you to see what works and what doesn't.

Financial Tools and Employee Time Tracking

IES uses a host of online software for handling of its financial needs. For example, IES uses Approveme to handle its contract management. The software tracks activity and capture signatures in minutes. It enables IES to automate and simplify creation, management, and storage of the contracts sent and signed by clients. For its payroll, IES is using Intuit QuickBooks Payroll which enables the company to create and manage employee payment records. In addition, IES is using an RFID reader for time tracking where employees can Clock in/out using a Key Fob. The Reader integrates with QuickBooks and provides a report for quickly understanding and tracking employees' timesheet. Additionally, IES uses both PayPal and Authorize.net for merchant gateways for processing of customers payments in various forms (credit cards, debit cards, PayPal, and PayPal Credit).

Web Design and Social Media Integration

IES creates engaging, interactive websites using social media features such as blogs, forums, wikis, news and announcements, event calendars, media galleries, RSS syndication, sharing and bookmarking toolbars. These features provide technology solutions to help implement a social media strategy by "engaging audience" and distributing content across various social platforms. According to Viking

Mann, Marketing director at IES, the company uses Adobe Suite, including Photoshop for editing and compositing of photos, web, and mobile app designs and Dreamweaver for design and development of modern, responsive websites (IES, 2018).

Social media platforms such as Facebook, Twitter, LinkedIn and YouTube are great communication and marketing tools. They allow customers to give instant feedback on products and services. IES uses many social media tools in order to reach a broader audience and expand its online presence. The company selects the right channels to boost its leads, and then drives engagement in its web content through conversation and community (IES, 2018).

SUMMARY AND CONCLUSION

The world of work is experiencing an unprecedented transformation driven by technology. In recent years, work has shifted from the physical to the digital and the popularity of digital workplaces has soared. Today, global employees still prefer to exchange face to face conversation with their colleagues. However, the nature of work will change substantially and will likely be very different form today in 5 to 10 years. Remote teams and better communications technology will make face-to-face communications obsolete in the future. Employees' changing lifestyles and their desire to work outside of the office are driving this evolution. Additionally, the millennial generation, now entering employment in vast numbers, is reshaping the workplace. They will dominate the global workforce and are more willing to embrace workplace technology. They prefer to communicate electronically at work than face to face. They care strongly about having access to advanced technologies, believe that access to technology makes them more effective at work, and are more likely to quit a job with substandard technology.

This study concluded that a digital workplace is the foundation for a successful business strategy-it enhances collaboration and leads to increased productivity. Digital workplace solutions introduce both challenges and new possibilities to many aspects of physical workplace, internet architecture, protocols, services, and applications. Managing digital workplace program for a large organization can be a challenging task and it's growing more complex every year. To realize the business benefits of a truly digital workplace, organizations need to prepare for the massive workplace change, use digital workplace technologies, and head in the direction of creating intelligence context around people. The agile workplace transformation initiative, discussed in this paper, should provide a balanced work–life program for its employees while simultaneously advancing organizational goals in productivity, efficiency, and space planning. Progressive companies provide their employees with easy-to-use hardware and software collaboration tools that can be upgraded and expanded over time, with minimal training and efforts. The success of the digital workplace will be constituted by a well-orchestrated approach that addresses all of steps highlighted in this article.

Finally, the experience of IES, Inc. in implementing digital workplace solutions, presented in this paper provides a guideline for practitioners to better understand the potential enabling and constraining effects of implementing digital workplace technologies in different organizations.

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